Some Reactions on some Reflections on the Phenomenon of French Didactique

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Some Reactions on some Reflections on the Phenomenon of *French Didactique*

A reply from N. Balacheff to A. Sierpinska

Anna Sierpinska in the last 1995 issue of JMD has initiated an interesting type of paper, giving the view of a research community from the outside. Usually, the view is given by researchers themselves trying to give the best image of what they do, what they think they have produced. The view from outside is somewhat more critical, and as a result possibly more useful. What is meant by a research community could be identified on various bases, from scientific criteria (like the community using a specific approach, such as "constructivism" or "action-research"), to professional criteria (like the community of mathematics educators) or to geographical criteria (the community of German researchers). It is the latter that Sierpinska seems to have chosen, offering some reflections on *French Didactique*.

But at this point she immediately encounters a difficulty, since while “French” refers to a geographical criterion, “Didactique” refers to a scientific one. She explains in the first lines of her paper that the emphasis will be on the conceptual reference to the *théorie des situations didactiques*, but the article ends with an ironical quotation referring to the super ego of *French didacticiens*. All this suggests a confusion between geographical and scientific characteristics. The exercise is difficult and it seems to me that Sierpinska has difficulty escaping the temptation of caricature. Actually, leaving aside the work of Vergnaud and the related debate on the place of the learner as a subject in the search for a theory of mathematics education, she has chosen *de facto* to discuss Brousseau's and Chevallard's contribution to the field. Here is the real focus of the article, ultimately ignoring the role of the debate raised by Douady's *jeu de cadres*, by the Vergnaud emphasis on the psychological subject, by Glaeser's questions on the meaning of the mathematical activity, by Laborde's emphasis on the role of language, by Robert's analysis of the specificity of University teaching of mathematics or, more recently, the role of the debate raised by the impact of the development of computer-based environments for human learning.

By the way, Cabri-géomètre is not an innovation from the so-called *French didactique* as Sierpinska states, but the result of a synergy between computer-science and mathematics in the very special ecological context of the Grenoble team. Cabri-géomètre is more a question for research in mathematics education than a product *stricto sensu* of this research; it is now in several places the source of fundamental questions. The example of Cabri-géomètre is an interesting example of the on-going construction of the relationships from a research

perspective between computer-science and research in mathematics education. To understand this is not an easy task, and it has been taken as a problem as such by Paul Goldenberg in Boston.

One of the problems to solve when investigating the history, the epistemology and the social dimension of ideas or of a scientific community, is the problem of the corpus on which one can rely. For example, Paul Goldenberg working on Cabri-géomètre collects for this purpose articles, unpublished material and interviews with people which he organizes in Grenoble. Without a careful approach to this material and the possibility of sharing the material on which the analytical account is based, one may be limited to sharing mere opinion. One easy source is the published material, but it is not necessarily so easy to handle. In the case of Sierpinska's article I would like to take two examples which exemplify what I mean.

The first example is the use that Sierpinska makes on page 165 of her article of a quotation from a paper I published in 1993. From this quotation one might understand that I argue for "replacing the teacher by a 'pure' machine-learner interaction" (ibid.), since Sierpinska writes, a few lines before that, that from the evidence of the difficulties raised by the didactical contract I conclude that "we might have to consider whether the teacher is needed at all." This is in complete contradiction with what I wrote in two places of the same paper : (1) on page 146-7 of the paper I explained that a role of the teacher is to negotiate with learners the meaning of the use of a piece of educational software, (2) and finally I concluded on page 157 of this paper that "the teacher is necessary for the success of the use of computer-based learning environments", and I then gave reasons why teachers play a fundamental role. How is such a misunderstanding possible? One reason could be that Sierpinska did not go beyond page 147 of my paper, but a more serious reason rests in the way such a text has been written and the language has been used. What she quoted is taken from a section entitled: "Tomorrow as seen from yesterday" (sect. 6.1.2., p.137), which with some humorous intent introduced the Artificial Intelligence idea that we could design teacher-proof machines since every difficulty in schools appeared to their eye to be due to teacher input (teacher imposing, teacher letting students feel guilty for making errors, etc.). And so I continued, writing: "we might have to consider whether the teacher is needed at all" (ibid.). At this point there appears another phenomenon related the difficulty of expressing oneself properly in a foreign language. "We" in this quotation, as well in the preceding sentence ("we could design teacher proof machines ..."), does not refer to me but to somebody. It is not a polite version of "I", but a translation of the French "on" which has no personal reference. So two difficulties appear here, on the one

hand a style for expressing ideas which might not be understood (humour may be the hardest thing to share), on the other hand the difficulty of expressing ideas (or reading) with enough nuance in a foreign language. All this calls for a rigorous approach of a corpus supporting the discussion of ideas of other researchers.

The second example is the use of a quotation from Artigue which says that "Didactics is now clearly considered as a legitimate specialization of research in applied mathematics […]" From that Sierpinska discusses the fact that research in mathematics education is not applied mathematics. Even the French will not discuss that; actually Sierpinska drew too much from Artigue's quotation and from her lack of information about the academic organization of mathematics in France. Some French mathematicians agree that the best place for research in *didactique* to develop is within the community of mathematicians, and as a result (and through a not very easy process) they accept having researchers in *didactique* as members of the board which organizes the academic life of mathematicians. This means a tight relationship and extensive discussions between researchers in *didactique* and mathematicians, but it does not imply that the works examined are mathematics in a technical sense, and it does not deny the Human Science dimension of our research. So, one could discuss the choice of the French to maintain very close relationships with the community of mathematicians, but this does not have a naive basis as the obligation for us to use "mathematical methods" or to "build mathematical models" (even though some of us might try such approaches). Actually, one could observe that several French researchers in *didactique* are psychologists or from Science of Education. The situation is far from being simple.

Sierpinska has undertaken a very difficult task, and I would like to acknowledge that she brings to the fore important questions very often discussed behind the curtain. While I share some of her concerns, I very much disagree on some others —but this is not the right place to enter into a debate. This note, being a reaction, should remain short, but I will come back later to this discussion. And I encourage others to do so. The main point may be, if we want to go ahead with such debates in our journals, to try to adopt as rigorous as possible an approach so that we guarantee to our readership more a scientific debate than a polemic one. This rigour must be at the level of the general ideas as well as at the level of more basic information. For example, there is no association named APEM in France (ibid. p.166) but an *Association des Professeurs de Mathématiques de l'Enseignement Publique* (APMEP).

In this way we (*nous*) will contribute to the construction of the history of our field as well as to the construction of a more international and a more beyond-the-culture research community.